

# LAWRENCE LIVERMORE REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: Feb. 16 – Feb. 22, 2010

## KPIX looks down the road to improved truck fuel efficiency



### Smoke test under way in the wind tunnel.

Imagine a big rig heading down the highway with some extra devices on the underbody of the trailer. On closer inspection, there also are devices between the cab and the trailer and on the back of the trailer.

In this configuration, the truck driver could save up to \$15,000 per year in fuel costs. Now times that by all the semi-trucks on the nation's highways.

Last week, the Laboratory unveiled a series of devices that are being tested in the world's largest wind tunnel at NASA Ames Research Center that one day may save the nation up to \$10 billion in diesel fuel costs.

In support of the Department of Energy's mission to reduce the country's dependency on fossil fuels, the Laboratory has teamed with Navistar Inc., NASA's Ames Research Center, the U.S. Air Force and industry to develop and test devices for reducing the aerodynamic drag of semi-trucks. The devices could increase fuel efficiency by as much as 12 percent and could prevent 36 million tons of carbon dioxide from being released into the atmosphere annually, roughly the same amount of CO<sub>2</sub> that is emitted from four 1-gigawatt power plants every year.

Aerodynamic drag is caused by pressure differences around the vehicle. At highway speeds, a semi-truck uses more than 50 percent of the energy produced by the vehicle engine to overcome aerodynamic drag, while rolling resistance consumes roughly 30 percent of the usable energy.

Reducing that drag is the key to gaining better fuel mileage.

To see more, see <http://cbs5.com/local/fuel.efficient.truck.2.1499147.html>

### **KTVU takes a look at the National Ignition Facility laser fusion project**



#### **Inside the NIF target chamber**

Harnessing the energy of the stars is no easy feat, but it's something scientists at the Laboratory's National Ignition Facility are working on every day.

The goal is to create fusion in the laboratory, a process in which more energy comes out than goes in. "The harnessing would be the power of infinite energy," NIF Director Ed Moses said.

Fusion experiments are set to begin later this year.

To see more, go to [https://publicaffairs.llnl.gov/news/lab\\_report/2010/KTVU\\_NIF0210.mov](https://publicaffairs.llnl.gov/news/lab_report/2010/KTVU_NIF0210.mov)

### **Laboratory research team awarded AAAS Newcomb Cleveland Prize**



### **Artist's conception of the multiple planet system HR 8799.**

A Laboratory researcher's paper published in November 2008 is a co-winner of this year's American Association for the Advancement of Science (AAAS) Newcomb Cleveland Prize. The paper is one of two outstanding papers published in *Science* from June 1, 2008, through May 31, 2009.

Bruce Macintosh of the Lab's Physics and Life Science Directorate was one of the lead authors of the paper titled, "Direct Imaging of Multiple Planets Orbiting the Star HR 8799," which appeared in the Nov. 28, 2008, edition of *Science*. Christian Marois, a former LLNL postdoc now at NRC Herzberg Institute of Astrophysics in Canada, was the other lead author.

Another paper titled "Images of an Exosolar Planet 25 Light-Years From Earth," which also appeared in the Nov. 28, 2008, edition of *Science*, shares the award. That paper included LLNL author Mike Fitzgerald with Paul Kalas of UC Berkeley serving as the lead author.

The LLNL paper details how astronomers for the first time took snapshots of a multi-planet solar system, much like ours, orbiting another star. The new solar system orbits a dusty young star named HR 8799, which is 140 light years away and about 1.5 times the size of our sun. Three planets, roughly 7 to 10 times the mass of Jupiter, orbit the star.

For more, go to [https://publicaffairs.llnl.gov/news/news\\_releases/2010/NR-10-02-11.html](https://publicaffairs.llnl.gov/news/news_releases/2010/NR-10-02-11.html)

### **A COLOSSAL X-ray machine for nukes**



**A pyramid-shaped mirror bounces green light from the scintillator in four different directions onto four identical turning mirrors.**

The government is upgrading the X-ray technology that detects flaws in its nuclear weapons

stockpile, similar to how CT scanners generate 3D images of the inside of the human body.

The new machine, called the Confined Large Optical Scintillator Screen and Imaging System, or CoLOSSIS, uses thousands of 2D X-ray images to produce one 3D image depicting the inside of a nuclear weapon. Developers say the new system will pick up more defects in the nuclear stockpile than the current 2D sensors and will eliminate the need to disassemble weapons to search for problems, which is a process that can be destructive.

The Energy Department's National Nuclear Security Administration teamed up with scientists from the Lawrence Livermore National Laboratory and the Pantex Plant to build the system.

To read more, go to

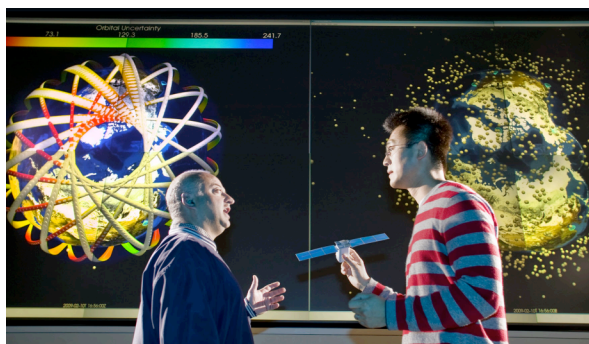
<http://www.nationaldefensemagazine.org/archive/2010/March/Pages/XRayMachineforNukes.aspx>

### **Latest *Newsline* available**



*Newsline* provides the latest Lab research and operations news. See the most recent issue at <https://newsline.llnl.gov>

### **Photo of the week**



**It went where?:** Scientists Alex Pertica and Ming Jiang are working to combine improved orbital prediction capabilities for the thousands of objects in orbit with observational data to better determine the likelihood of space collisions.

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LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the Livermore Lab Report, send e-mail <mailto:labreport@llnl.gov>.

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